

PATENT ABSTRACTS OF JAPAN

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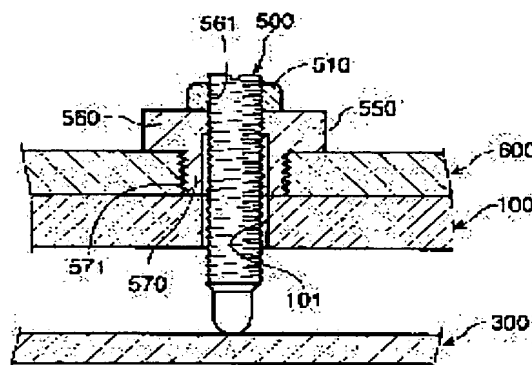
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(54) SUBSTRATE FOR TEST

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a substrate for test, which can accurately maintain the position of a contactor while controlling a displaced amount of a member which makes displacement with high heat in an electrical test of a semiconductor device, etc., by a member for holding a parallelism control screw.

SOLUTION: The substrate for test comprises a parallelism control member 500 for controlling the parallelism of a contactor unit 300 for electrically connecting an object to be tested with a substrate body 100, and a control member holder 550 for holding the parallelism control member 500. The control member holder 550 is arranged so as to control the displaced amount of the contactor in the contactor unit 300 corresponding to the entire displaced amount caused by the heat in the test.



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CLAIMS

[Claim(s)]

[Claim 1] It is a substrate for a test for performing the electric trial of test objective-ed objects, such as a semiconductor device, also as that under an elevated temperature. The substrate body for a test, While having contact which is prepared in the one side of this substrate body for a test, and performs electric contact to a test objective-ed object The parallelism controller material which adjusts the parallelism of the contact unit to this substrate body for a test from the other side in contact with the contact unit by which electrical installation is made, and this contact unit, It has the controller material holder which is attached in said substrate body side for a test, and holds parallelism controller material. Said controller material holder The substrate for a test characterized by being prepared corresponding to the amount of displacement of the whole by the heat at the time of a trial so that the amount of displacement of contact of the contact unit may be adjusted.

[Claim 2] It is the substrate for a test characterized by being a substrate for a test according to claim 1, and forming said controller material holder so that it may displace to said other side with the heat at the time of a trial.

[Claim 3] It is the substrate for a test which it is a substrate for a test according to claim 1 or 2, and the back up plate is being fixed to the other side of said substrate for a test, and is characterized by attaching said controller material holder in said substrate body for a test.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the substrate for a test for performing the electric trial of test objective-ed objects, such as a semiconductor device, also as that under an elevated temperature.

[0002]

[Description of the Prior Art] As the wafer test by the probe card is shown in drawing 3 from before, the substrate for a test with which the contact unit 300 and the substrate body 100 for a test which contain in a test objective-ed object slack semiconductor device contact which performs electric contact are formed into another object is used.

[0003] As for this substrate for a test, the substrate body 100 for a test and this contact unit 300 are electrically connected through INTAPOZA 200. Moreover, this contact unit 300 is prepared in the top face so that the parallelism controller material 500 may contact a top face, while it is supported from a lower part by the supporter material 400 fixed under the substrate body 100 for a test. This parallelism controller material 500 consists of balls 530 prepared between the parallelism stretching screw 520 with which a point projects caudad through punching established in the substrate body 100 for a test, and said contact unit 300 and parallelism stretching screw 520, as shown in drawing 3 and drawing 4 . The upper limit section is screwed on the back up plate 650 fixed above the substrate body 100 for a test, and said parallelism stretching screw 520 adjusts the amount of protrusions by the side of a lower part by rotation, and thereby, it is formed so that the parallelism of the contact unit 300 may be adjusted. In addition, in the example of illustration, another independent back up plate 640 is being fixed to the outside of the back up plate 650 where the parallelism stretching screw 520 was screwed on with the fixed screw by the substrate body 100 for a test.

[0004]

[Problem(s) to be Solved by the Invention] The above-mentioned substrate for a test reached even the 100-degree C elevated temperature at the time of a trial, and the substrate body 100 for a test deformed for this heat, the vertical location of the contact unit 300 was changed in the parallelism stretching screw 520 list in connection with this deformation, the height of the contact surface with the wafer at the tip of contact was changed, and it had the problem that this invited defective continuity. And when this invention persons examined this variation rate, as for the substrate for a test, the tip of the contact unit 300 of a probe card found out displacing to the test objective-ed object side (lower part side) under the effect of the heat of a wafer.

[0005] this invention is originated in view of the above-mentioned situation — having — the time of a trial — setting — heat — a variation rate — an amount is adjusted and it aims at offering the substrate for a test which can maintain the location of contact exactly.

[0006]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the substrate for a test concerning this invention It is a substrate for a test for performing the electric trial of test objective-ed objects, such as a semiconductor device, also as that under an elevated temperature. The substrate body for a test, While having contact which is prepared in

the one side of this substrate body for a test, and performs electric contact to a test objective-ed object The parallelism controller material which adjusts the parallelism of the contact unit to this substrate body for a test from the other side in contact with the contact unit by which electric contact is made, and this contact unit, It has a controller material holder holding the parallelism controller material attached in said substrate body side for a test. Said controller material holder the direction negated to the variation rate of the whole probe card by the heat at the time of a trial — displacing — as a result — the heat of the contact unit — a variation rate — it is prepared so that an amount may be stopped.

[0007] The heat from a wafer conducts contact and heats the contact unit. This heat heats a propagation controller material holder for a screw. That is, a controller material holder becomes an elevated temperature from the back up plate or a substrate. Therefore, thermal expansion of the controller material holder is carried out to a wafer and an opposite direction by using the back up plate as the supporting point by adopting the big quality of the material of thermal expansion as a controller material holder. The screw is fixed to the part (part which is most separated from a wafer) of the point with the largest variation rate of a controller material holder in order to use this thermal expansion effectively. By this, with the direction of a wafer, a screw will be displaced to the opposite side and the contact unit will displace it to the direction of a wafer, and the opposite side as a result. The above result, the phenomenon in which the whole probe card displaces in the direction of a wafer, and the phenomenon in which the contact unit displaces to the direction of a wafer and the opposite side are offset, and the amount of displacement of a probe card decreases.

[0008] If it is in the substrate for a test which consists of this configuration, even if it becomes an elevated temperature and the substrate body for a test deforms at the time of a trial, the controller material holder which holds parallelism controller material to this deformation corresponds, the amount of displacement of contact of the contact unit is adjusted, and, for this reason, the amount of displacement of the location of the contact surface with the test objective-ed object of contact can be made small.

[0009] Moreover, if it is in the substrate for a test concerning this invention, as for said controller material holder, it is desirable to adopt the configuration prepared by the heat at the time of a trial so that it may displace to said other side.

[0010] That is, generally, since the substrate body for a test is displaced to a test objective-ed object side (one side) with heat, when the controller material holder attached in this in the state of immobilization displaces to the other side, it can adjust the amount of displacement of contact of the contact unit, and can make small the amount of displacement of the location of the contact surface with the test objective-ed object of contact.

[0011] moreover, although it is also possible to carry out direct immobilization (for example, screwing) of the controller material holder to the substrate body for a test if it is in the substrate for a test concerning this invention, the back up plate fixes to the other side of the substrate body for a test — having — a controller material holder — this back up plate — minding — the substrate body for a test — attaching — ***** — things are desirable and deformation of the substrate body for a test can be prevented by the back up plate by preparing the back up plate in this way.

[0012]

[Embodiment of the Invention] The gestalt of operation of the substrate for a test concerning this invention is explained referring to drawing 1 and drawing 2 . The rough sectional view of the substrate for a test which drawing 1 requires for the gestalt of operation of this invention, and drawing 2 are the important section expanded sectional views of the substrate for a test concerning the gestalt of operation of this invention.

[0013] While the substrate for a test concerning the gestalt of operation of this invention is formed so that it may be prepared in the substrate body 100 for a test, and a lower part side and electric contact may be performed to a test objective-ed object The contact unit 300 in which electrical installation is made through INTAPOZA 200 by this substrate body 100 for a test, The back up plate 600 fixed above the substrate body 100 for a test, and the controller material holder 550 attached in the substrate body 100 for a test through this back up plate 600, It has

the parallelism controller material 500 for being screwed on this controller material holder 550, and adjusting the parallelism of the contact unit 300.

[0014] Said contact unit 300 consists of a needle unit which consists of two or more contact for contacting a test objective-ed object and connecting electrically, and a needle unit holder holding this needle unit, and the needle unit is prepared so that said parallelism controller material 500 may be contacted on a top face, while being prepared so that said INTAPOZA 200 may be contacted electrically.

[0015] Moreover, said needle unit holder is supported by the support means 400 mentioned later. **** INTAPOZA 200 has the flat-spring section which can adopt a well-known thing conventionally, for example, operates independently, and what is prepared so that between the contact unit 300 and the substrate bodies 100 for a test may be connected electrically can be used for it.

[0016] Said support means 400 consists of a flange 411 prepared so that the edge lower part side of said contact unit 300 might be countered with the contact unit 300, and elastic members (illustration abbreviation), such as a spring which intervened between this flange 411 and the contact unit 300, in the gestalt of this operation, although being conventionally based on a well-known means is also possible. The flange 411 as this support means 400 is formed in the supporter material 410 fixed to the back up plate 600 by the fixed means 440 so that it may mention later, and this flange 411 is projected and formed towards the inside from the fixed part grade of the supporter material 410. With the fixed screw as a fixed means 440, it is fixed to said back up plate 600, and the fixed screw 440 inserts in punching established in the substrate body 100 for a test from the top-face side, and, specifically, said supporter material 410 is screwed on the supporter material 410.

[0017] Said back up plate 600 is being fixed with the fixed screw 601 of the substrate body 100 for a test, and that in which the screw head section was prepared horizontally is used for this fixed screw 601 like NABENEJI. For this reason, since the back up plate 600 does not restrain that the substrate body 100 for a test expands horizontally under the effect of heat, there is a merit that the amount of displacement of the height direction of a probe card decreases. For example, when the substrate for a test and the back up plate 600 are being fixed completely, it will be in the condition of bimetal and will curve in the vertical direction. Then, it is made not to regulate mutually carrying out [in which the substrate for a test and the back up plate 600 carry out thermal expansion, respectively by establishing a clearance in the screw hole for the fixed screw 601 which fixes the substrate for a test, and the back up plate 600]. Consequently, the phenomenon of curving in the vertical direction is reduced. Here, since the taper is formed in the screw head section of a flat countersunk head screw as the fixed screw 601 is a flat countersunk head screw and it is compulsorily restrained by the core of a screw hole, a location gap is not permitted. However, if the screw head section uses like NABENEJI what was prepared horizontally as a fixed screw 601, a gap of the screw hole of the substrate for a test and the back up plate is permissible. For this reason, if the fixed screw 601 is a flat countersunk head screw, since the location gap between the substrate for a test and the back up plate is not permitted, each thermal expansion of the substrate for a test and the back up plate 600 will be regulated, but if the fixed screw 601 is NABENEJI, this thermal expansion will not be regulated. Consequently, the phenomenon of curving in the vertical direction is reduced.

[0018] Moreover, said controller material holder 550 is screwed on the back up plate 600 by two or more places (three places), and the parallelism stretching screw 500 with said parallelism controller material 500 to carry out is screwed on this controller material holder 550. By rotation, this parallelism stretching screw 500 is formed so that it may change in the vertical direction. This parallelism stretching screw 500 is screwed on the controller material holder 550, the punching 101 where the lower part was formed in the substrate body 100 for a test is inserted in, and, more specifically, the tip is prepared in contact with the top face of the contact unit 300 (refer to drawing 2). Moreover, this back up plate 600 has the lobe 603 by which the projection and said controller material holder 550 were screwed on inside the part which fixes the supporter material 410.

[0019] Moreover, the jam nut 510 for regulating rotation is screwed on the upper part, and said

parallelism stretching screw 500 is formed so that it may not rotate carelessly. Moreover, although the parallelism stretching screw 500 contacts said contact unit 300 in a lower part (point), the tip of this parallelism stretching screw 500 is formed in the shape of a curved surface, and, for this reason, it makes the ball unnecessary like before.

[0020] Moreover, the controller material holder 550 which holds the parallelism stretching screw 500 as mentioned above is both screwed possible [modification of the location of the vertical direction] by [which make it rotate] being screwed in the back up plate 600 removable.

[0021] Moreover, this controller material holder 550 consists of ingredients which deform into the bottom of the elevated temperature at the time of the trial of a wafer with heat (expansion), and the upper part of this controller material holder 550 is prepared so that it may deform in the direction estranged from the lower part. That is, if it is prepared by the heat at the time of a trial corresponding to the variation rate of the substrate body 100 for a test so that the amount of displacement of contact of the contact unit 300 may be adjusted, and it puts in another way, said controller material holder 550 is formed so that the screwing part of the parallelism stretching screw 500 may be located near the original state, even if the substrate body 100 for a test displaces to a lower part side (test objective-ed object side) with the heat at the time of a trial.

[0022] That is, this controller material holder 550 is equipped with the fixed part 571 to the back up plate 600 (or substrate body 100 for a test), and the screwing section 561 in which the parallelism stretching screw 500 is screwed, and this fixed part 571 and the screwing section 561 are formed so that a relative distance may estrange according to high temperature (refer to drawing 2).

[0023] If it explains in full detail more, the controller material holder 550 will be formed in [the body 560 of a holder and the protrusion section 570 which protruded from the lower part of this body 560 of a holder] one. The female screw section as the screwing section 561 by which said parallelism stretching screw 500 is screwed in the up inside of this body 560 of a holder is formed, and the male screw as said fixed part 571 screwed in the female screw formed in the back up plate 600 is formed in the external surface of said protrusion section 570.

[0024] Moreover, the interior is prepared in the shape of a cavity, and the controller material maintenance implement 550 (the body 560 of a holder and protrusion section 570) is formed so that said parallelism controller material 500 may contact only the screwing section 561. In addition, in the example of illustration, although it is prepared so that the inferior surface of tongue of the adjustment holder 550 (protrusion section 570) may contact the substrate body 100 for a test, preparing so that both may be fallen ill is also the matter in which a design change is possible suitably. This controller material holder 550 can be constituted from an ingredient with big coefficient of linear expansion, such as aluminum, etc.

[0025] If it is in the substrate for a test which consists of the above-mentioned configuration, even if it results in an elevated temperature at the time of a trial and the substrate body 100 for a test deforms into a test objective-ed object side (lower part side), the controller material holder 550 is also transformed and it becomes possible to maintain the original-state location of the parallelism stretching screw 500. Since especially the parallelism controller material 500 is formed so that only the controller material holder 550 may be touched, this adjustment is exact and easy for it.

[0026] Moreover, since the controller material holder 550 is formed in the substrate body 100 side for a test removable, it can be exchanged to the desired controller material holder 550 according to modification of a test objective-ed object etc. Moreover, since the controller material holder 550 is attached in the vertical direction movable, it can also be tuned finely and used for a desired location according to modification of a test objective-ed object etc.

[0027] In addition, a design change is possible for this invention suitably within limits which it is not limited to the configuration of each above-mentioned operation gestalt, and this invention means.

[0028] For example, it is also possible to prepare so that the controller material holder 550 may be attached to the substrate body 100 for a test instead of the back up plate 600 direct picking.

[0029] Moreover, although the gestalt of the above-mentioned implementation explained said

controller material holder 550 in the vertical direction about migration and the thing prepared removable to the back up plate 600, it is also possible to fix and attach the controller material holder 550.

[0030]

[Effect of the Invention] As explained above, also with the heat at the time of a trial, the substrate for a test concerning this invention can make the location of contact of the contact unit near the original state, and can perform a trial in the condition with a good flow.

[Translation done.]

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TECHNICAL FIELD

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PRIOR ART

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[0003] As for this substrate for a test, the substrate body 100 for a test and this contact unit 300 are electrically connected through INTAPOZA 200. Moreover, this contact unit 300 is prepared in the top face so that the parallelism controller material 500 may contact a top face, while it is supported from a lower part by the supporter material 400 fixed under the substrate body 100 for a test. This parallelism controller material 500 consists of balls 530 prepared between the parallelism stretching screw 520 with which a point projects caudad through punching established in the substrate body 100 for a test, and said contact unit 300 and parallelism stretching screw 520, as shown in drawing 3 and drawing 4 . The upper limit section is screwed on the back up plate 650 fixed above the substrate body 100 for a test, and said parallelism stretching screw 520 adjusts the amount of protrusions by the side of a lower part by rotation, and thereby, it is formed so that the parallelism of the contact unit 300 may be adjusted. In addition, in the example of illustration, another independent back up plate 640 is being fixed to the outside of the back up plate 650 where the parallelism stretching screw 520 was screwed on with the fixed screw by the substrate body 100 for a test.

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, also with the heat at the time of a trial, the substrate for a test concerning this invention can make the location of contact of the contact unit near the original state, and can perform a trial in the condition with a good flow.

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TECHNICAL PROBLEM

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the substrate for a test concerning this invention It is a substrate for a test for performing the electric trial of test objective-ed objects, such as a semiconductor device, also as that under an elevated temperature. The substrate body for a test, While having contact which is prepared in the one side of this substrate body for a test, and performs electric contact to a test objective-ed object The parallelism controller material which adjusts the parallelism of the contact unit to this substrate body for a test from the other side in contact with the contact unit by which electric contact is made, and this contact unit, It has a controller material holder holding the parallelism controller material attached in said substrate body side for a test. Said controller material holder the direction negated to the variation rate of the whole probe card by the heat at the time of a trial -- displacing -- as a result -- the heat of the contact unit -- a variation rate -- it is prepared so that an amount may be stopped.

[0007] The heat from a wafer conducts contact and heats the contact unit. This heat heats a propagation controller material holder for a screw. That is, a controller material holder becomes an elevated temperature from the back up plate or a substrate. Therefore, thermal expansion of the controller material holder is carried out to a wafer and an opposite direction by using the back up plate as the supporting point by adopting the big quality of the material of thermal expansion as a controller material holder. The screw is fixed to the part (part which is most separated from a wafer) of the point with the largest variation rate of a controller material holder in order to use this thermal expansion effectively. By this, with the direction of a wafer, a screw will be displaced to the opposite side and the contact unit will displace it to the direction of a wafer, and the opposite side as a result. The above result, the phenomenon in which the whole probe card displaces in the direction of a wafer, and the phenomenon in which the contact unit displaces to the direction of a wafer and the opposite side are offset, and the amount of displacement of a probe card decreases.

[0008] If it is in the substrate for a test which consists of this configuration, even if it becomes an elevated temperature and the substrate body for a test deforms at the time of a trial, the controller material holder which holds parallelism controller material to this deformation corresponds, the amount of displacement of contact of the contact unit is adjusted, and, for this reason, the amount of displacement of the location of the contact surface with the test objective-ed object of contact can be made small.

[0009] Moreover, if it is in the substrate for a test concerning this invention, as for said controller material holder, it is desirable to adopt the configuration prepared by the heat at the time of a trial so that it may displace to said other side.

[0010] That is, generally, since the substrate body for a test is displaced to a test objective-ed object side (one side) with heat, when the controller material holder attached in this in the state of immobilization displaces to the other side, it can adjust the amount of displacement of contact of the contact unit, and can make small the amount of displacement of the location of the contact surface with the test objective-ed object of contact.

[0011] moreover, although it is also possible to carry out direct immobilization (for example, screwing) of the controller material holder to the substrate body for a test if it is in the

substrate for a test concerning this invention, the back up plate fixes to the other side of the substrate body for a test — having — a controller material holder — this back up plate — minding — the substrate body for a test — attaching — ***** — things are desirable and deformation of the substrate body for a test can be prevented by the back up plate by preparing the back up plate in this way.

[0012]

[Embodiment of the Invention] The gestalt of operation of the substrate for a test concerning this invention is explained referring to drawing 1 and drawing 2. The rough sectional view of the substrate for a test which drawing 1 requires for the gestalt of operation of this invention, and drawing 2 are the important section expanded sectional views of the substrate for a test concerning the gestalt of operation of this invention.

[0013] While the substrate for a test concerning the gestalt of operation of this invention is formed so that it may be prepared in the substrate body 100 for a test, and a lower part side and electric contact may be performed to a test objective-ed object The contact unit 300 in which electrical installation is made through INTAPOZA 200 by this substrate body 100 for a test, The back up plate 600 fixed above the substrate body 100 for a test, and the controller material holder 550 attached in the substrate body 100 for a test through this back up plate 600, It has the parallelism controller material 500 for being screwed on this controller material holder 550, and adjusting the parallelism of the contact unit 300.

[0014] Said contact unit 300 consists of a needle unit which consists of two or more contact for contacting a test objective-ed object and connecting electrically, and a needle unit holder holding this needle unit, and the needle unit is prepared so that said parallelism controller material 500 may be contacted on a top face, while being prepared so that said INTAPOZA 200 may be contacted electrically.

[0015] Moreover, said needle unit holder is supported by the support means 400 mentioned later. ***** INTAPOZA 200 has the flat-spring section which can adopt a well-known thing conventionally, for example, operates independently, and what is prepared so that between the contact unit 300 and the substrate bodies 100 for a test may be connected electrically can be used for it.

[0016] Said support means 400 consists of a flange 411 prepared so that the edge lower part side of said contact unit 300 might be countered with the contact unit 300, and elastic members (illustration abbreviation), such as a spring which intervened between this flange 411 and the contact unit 300, in the gestalt of this operation, although being conventionally based on a well-known means is also possible. The flange 411 as this support means 400 is formed in the supporter material 410 fixed to the back up plate 600 by the fixed means 440 so that it may mention later, and this flange 411 is projected and formed towards the inside from the fixed part grade of the supporter material 410. With the fixed screw as a fixed means 440, it is fixed to said back up plate 600, and the fixed screw 440 inserts in punching established in the substrate body 100 for a test from the top-face side, and, specifically, said supporter material 410 is screwed on the supporter material 410.

[0017] Said back up plate 600 is being fixed with the fixed screw 601 of the substrate body 100 for a test, and that in which the screw head section was prepared horizontally is used for this fixed screw 601 like NABENEJI. For this reason, since the back up plate 600 does not restrain that the substrate body 100 for a test expands horizontally under the effect of heat, there is a merit that the amount of displacement of the height direction of a probe card decreases. For example, when the substrate for a test and the back up plate 600 are being fixed completely, it will be in the condition of bimetal and will curve in the vertical direction. Then, it is made not to regulate mutually carrying out [in which the substrate for a test and the back up plate 600 carry out thermal expansion, respectively by establishing a clearance in the screw hole for the fixed screw 601 which fixes the substrate for a test, and the back up plate 600]. Consequently, the phenomenon of curving in the vertical direction is reduced. Here, since the taper is formed in the screw head section of a flat countersunk head screw as the fixed screw 601 is a flat countersunk head screw and it is compulsorily restrained by the core of a screw hole, a location gap is not permitted. However, if the screw head section uses like NABENEJI what was prepared

horizontally as a fixed screw 601, a gap of the screwhole of the substrate for a test and the back up plate is permissible. For this reason, if the fixed screw 601 is a flat countersunk head screw, since the location gap between the substrate for a test and the back up plate is not permitted, each thermal expansion of the substrate for a test and the back up plate 600 will be regulated, but if the fixed screw 601 is NABENEJI, this thermal expansion will not be regulated.

Consequently, the phenomenon of curving in the vertical direction is reduced.

[0018] Moreover, said controller material holder 550 is screwed on the back up plate 600 by two or more places (three places), and the parallelism stretching screw 500 with said parallelism controller material 500 to carry out is screwed on this controller material holder 550. By rotation, this parallelism stretching screw 500 is formed so that it may change in the vertical direction. This parallelism stretching screw 500 is screwed on the controller material holder 550, the punching 101 where the lower part was formed in the substrate body 100 for a test is inserted in, and, more specifically, the tip is prepared in contact with the top face of the contact unit 300 (refer to drawing 2). Moreover, this back up plate 600 has the lobe 603 by which the projection and said controller material holder 550 were screwed on inside the part which fixes the supporter material 410.

[0019] Moreover, the jam nut 510 for regulating rotation is screwed on the upper part, and said parallelism stretching screw 500 is formed so that it may not rotate carelessly. Moreover, although the parallelism stretching screw 500 contacts said contact unit 300 in a lower part (point), the tip of this parallelism stretching screw 500 is formed in the shape of a curved surface, and, for this reason, it makes the ball unnecessary like before.

[0020] Moreover, the controller material holder 550 which holds the parallelism stretching screw 500 as mentioned above is both screwed possible [modification of the location of the vertical direction] by [which make it rotate] being screwed in the back up plate 600 removable.

[0021] Moreover, this controller material holder 550 consists of ingredients which deform into the bottom of the elevated temperature at the time of the trial of a wafer with heat (expansion), and the upper part of this controller material holder 550 is prepared so that it may deform in the direction estranged from the lower part. That is, if it is prepared by the heat at the time of a trial corresponding to the variation rate of the substrate body 100 for a test so that the amount of displacement of contact of the contact unit 300 may be adjusted, and it puts in another way, said controller material holder 550 is formed so that the screwing part of the parallelism stretching screw 500 may be located near the original state, even if the substrate body 100 for a test displaces to a lower part side (test objective-ed object side) with the heat at the time of a trial.

[0022] That is, this controller material holder 550 is equipped with the fixed part 571 to the back up plate 600 (or substrate body 100 for a test), and the screwing section 561 in which the parallelism stretching screw 500 is screwed, and this fixed part 571 and the screwing section 561 are formed so that a relative distance may estrange according to high temperature (refer to drawing 2).

[0023] If it explains in full detail more, the controller material holder 550 will be formed in [the body 560 of a holder and the protrusion section 570 which protruded from the lower part of this body 560 of a holder] one. The female screw section as the screwing section 561 by which said parallelism stretching screw 500 is screwed in the up inside of this body 560 of a holder is formed, and the male screw as said fixed part 571 screwed in the female screw formed in the back up plate 600 is formed in the external surface of said protrusion section 570.

[0024] Moreover, the interior is prepared in the shape of a cavity, and the controller material maintenance implement 550 (the body 560 of a holder and protrusion section 570) is formed so that said parallelism controller material 500 may contact only the screwing section 561. In addition, in the example of illustration, although it is prepared so that the inferior surface of tongue of the adjustment holder 550 (protrusion section 570) may contact the substrate body 100 for a test, preparing so that both may be fallen ill is also the matter in which a design change is possible suitably. This controller material holder 550 can be constituted from an ingredient with big coefficient of linear expansion, such as aluminum, etc.

[0025] If it is in the substrate for a test which consists of the above-mentioned configuration,

even if it results in an elevated temperature at the time of a trial and the substrate body 100 for a test deforms into a test objective-ed object side (lower part side), the controller material holder 550 is also transformed and it becomes possible to maintain the original-state location of the parallelism stretching screw 500. Since especially the parallelism controller material 500 is formed so that only the controller material holder 550 may be touched, this adjustment is exact and easy for it.

[0026] Moreover, since the controller material holder 550 is formed in the substrate body 100 side for a test removable, it can be exchanged to the desired controller material holder 550 according to modification of a test objective-ed object etc. Moreover, since the controller material holder 550 is attached in the vertical direction movable, it can also be tuned finely and used for a desired location according to modification of a test objective-ed object etc.

[0027] In addition, a design change is possible for this invention suitably within limits which it is not limited to the configuration of each above-mentioned operation gestalt, and this invention means.

[0028] For example, it is also possible to prepare so that the controller material holder 550 may be attached to the substrate body 100 for a test instead of the back up plate 600 direct picking.

[0029] Moreover, although the gestalt of the above-mentioned implementation explained said controller material holder 550 in the vertical direction about migration and the thing prepared removable to the back up plate 600, it is also possible to fix and attach the controller material holder 550.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the rough sectional view of the substrate for a test concerning the gestalt of operation of this invention.

[Drawing 2] It is the important section expanded sectional view of the substrate for a test concerning the gestalt of operation of this invention.

[Drawing 3] It is the rough sectional view of this conventional kind of substrate for a test.

[Drawing 4] It is the important section enlarged drawing of this conventional kind of substrate for a test.

[Description of Notations]

100 Substrate Body for Test

200 INTAPOZA

300 Contact Unit

400 Support Means

410 Supporter Material

500 Parallelism Controller Material

510 Jam Nut

550 Controller Material Holder

560 Body of Holder

561 Screwing Section

570 Protrusion Section

571 Fixed Part

600 Back Up Plate

[Translation done.]

* NOTICES *

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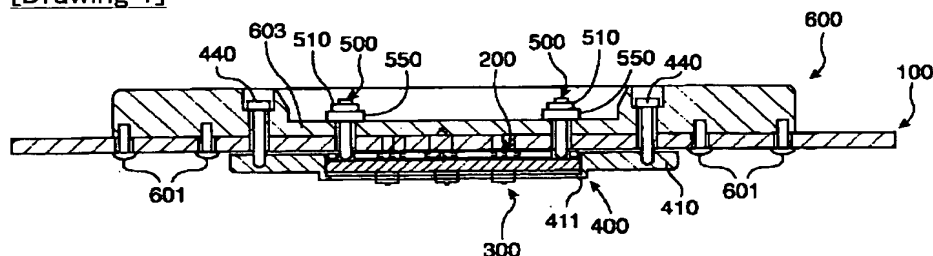
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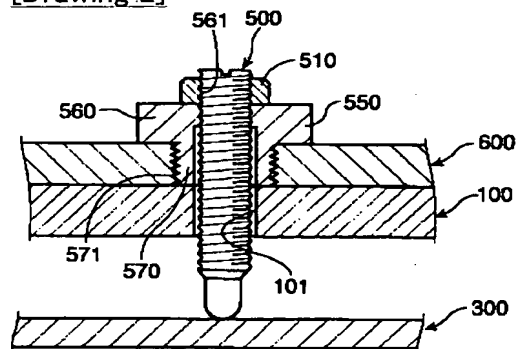
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DRAWINGS

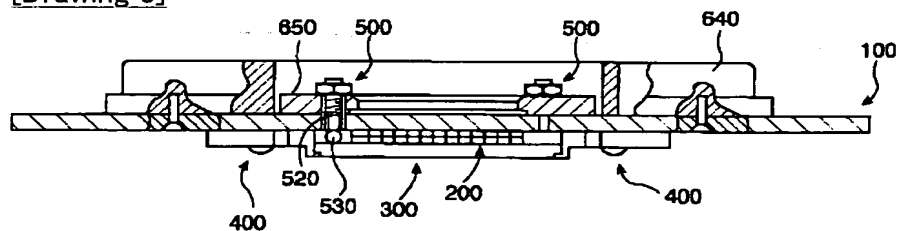
[Drawing 1]



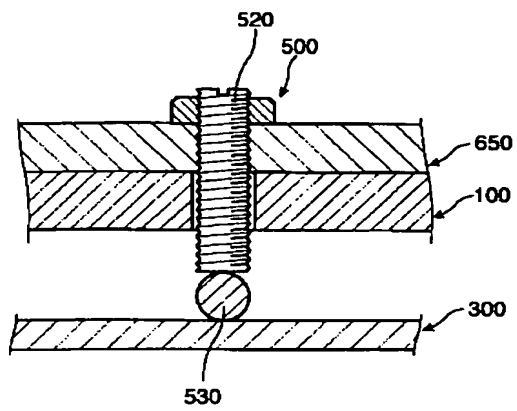
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]

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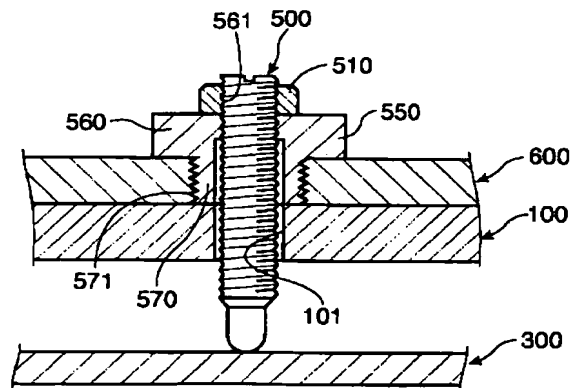
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(54) 【発明の名称】 テスト用基板

(57) 【要約】

【目的】 半導体デバイス等の電氣的試験時に、高熱により変位する部材の変位置を平行度調整ネジを保持する部材によって調整し、接触子の位置を的確に維持し得るテスト用基板を提供する。

【構成】 被試験対象物及びテスト用基板本体１００を電氣的に接続する接触子ユニット３００の平行度を調整する平行度調整部材５００と、平行度調整部材５００を保持する調整部材保持具５５０とを備え、調整部材保持具５５０が、試験時の熱による全体の変位置に対応して、接触子ユニット３００の接触子の変位置を調整するように設けられている。



【特許請求の範囲】

【請求項1】 高温下のもと半導体デバイス等の被試験対象物の電氣的試験を行うためのテスト用基板であって、

テスト用基板本体と、

このテスト用基板本体の一方側に設けられ被試験対象物に対して電氣的接触を行う接触子を有するとともに、このテスト用基板本体に電氣的接続がなされる接触子ユニットと、

この接触子ユニットに他方側から当接して接触子ユニットの平行度を調整する平行度調整部材と、

前記テスト用基板本体側に取り付けられ平行度調整部材を保持する調整部材保持具とを備え、

前記調整部材保持具は、試験時における熱による全体の変位量に対応して、接触子ユニットの接触子の変位量を調整するように設けられていることを特徴とするテスト用基板。

【請求項2】 請求項1記載のテスト用基板であって、前記調整部材保持具は、試験時における熱によって、前記他方側に変位するように設けられていることを特徴とするテスト用基板。

【請求項3】 請求項1又は2記載のテスト用基板であって、前記テスト用基板の他方側には、補強板が固定されており、

前記調整部材保持具は、前記テスト用基板本体に取り付けられていることを特徴とするテスト用基板。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、高温下のもと半導体デバイス等の被試験対象物の電氣的試験を行うためのテスト用基板に関する。

【0002】

【従来の技術】従来よりプローブカードによるウエハテストに関しては、図3に示すように、被試験対象物たる半導体デバイスに電氣的接触を行う接触子を含む接触子ユニット300とテスト用基板本体100とが別体化されているテスト用基板が用いられている。

【0003】かかるテスト用基板は、テスト用基板本体100と該接触子ユニット300とが、電氣的にはインターポーザ200を介して接続されている。また、該接触子ユニット300は、下方から、テスト用基板本体100の下方に固定された支持部材400によって支持されるとともに、その上面に、平行度調整部材500が上面に当接するように設けられている。この平行度調整部材500は、図3及び図4に示すように、テスト用基板本体100に設けられた穿孔を介して先端部が下方に突出する平行度調整ネジ520、及び、前記接触子ユニット300と平行度調整ネジ520との間に設けられたボール530から構成されている。前記平行度調整ネジ520は、その上端部が、テスト用基板本体100の上方

に固定された補強板650に螺着されており、回転により下方側への突出量を調整して、これにより、接触子ユニット300の平行度を調整するように設けられている。なお、図示例では、テスト用基板本体100には、平行度調整ネジ520の螺着された補強板650の外側に、別の独立した補強板640が固定ネジによって固定されている。

【0004】

【発明が解決しようとする課題】上記テスト用基板は、試験時に例えば100℃の高温にまで達し、この熱のために、テスト用基板本体100が変形してしまい、この変形に伴い平行度調整ネジ520並びに接触子ユニット300の上下位置が変動して、接触子の先端のウエハとの接触面の高さが変動し、これにより導通不良を招くという問題を有していた。そして、本発明者らは、かかる変位を検討したところ、テスト用基板は、ウエハの熱の影響でプローブカードの接触子ユニット300の先端が被試験対象物側（下方側）に変位していることを見出した。

【0005】本発明は上記事情に鑑みて創案されたものであって、試験時において、熱変位量を調整して、接触子の位置を的確に維持し得るテスト用基板を提供することを目的としている。

【0006】

【課題を解決するための手段】上記課題を解決するために、本発明に係るテスト用基板は、高温下のもと半導体デバイス等の被試験対象物の電氣的試験を行うためのテスト用基板であって、テスト用基板本体と、このテスト用基板本体の一方側に設けられ被試験対象物に対して電氣的接触を行う接触子を有するとともに、このテスト用基板本体に電氣的接触がなされる接触子ユニットと、この接触子ユニットに他方側から当接して接触子ユニットの平行度を調整する平行度調整部材と、前記テスト用基板本体側に取り付けられた平行度調整部材を保持する調整部材保持具とを備え、前記調整部材保持具は、試験時における熱によるプローブカードの全体の変位に対して打ち消す方向に変位し、結果として接触子ユニットの熱変位量を抑えるよう設けられている。

【0007】ウエハからの熱は、接触子を伝導して接触子ユニットを加熱する。この熱はネジを伝わり調整部材保持具を加熱する。すなわち、補強板や基板よりも調整部材保持具が高温になる。よって、調整部材保持具に熱膨張の大きな材質を採用することにより、調整部材保持具は補強板を支点としてウエハと反対方向に熱膨張する。かかる熱膨張を効果的に利用するため、調整部材保持具の変位が最も大きい先の部分（ウエハから最も離れた部分）にネジを固定している。これによって、ネジはウエハ方向とは反対側に変位することになり、結果として接触子ユニットがウエハ方向と反対側に変位することになる。以上の結果、プローブカード全体がウエハ方向

に変位する現象と、接触子ユニットがウエハ方向と反対側に変位する現象とが相殺され、プローブカードの変位量が減少する。

【0008】かかる構成からなるテスト用基板にあっては、試験時に高温となり、テスト用基板本体が変形しても、この変形に対して平行度調整部材を保持する調整部材保持具が対応して、接触子ユニットの接触子の変位量が調整され、このため、接触子の被試験対象物との接触面の位置の変位量を小さくすることができる。

【0009】また、本発明に係るテスト用基板にあっては、前記調整部材保持具は、試験時における熱によって、前記他方側に変位するように設けられている構成を採用することが望ましい。

【0010】つまり、一般的にテスト用基板本体は熱により被試験対象物側（一方側）に変位するため、これに固定状態で取り付けられた調整部材保持具が他方側に変位することにより、接触子ユニットの接触子の変位量を調整して、接触子の被試験対象物との接触面の位置の変位量を小さくすることができる。

【0011】また、本発明に係るテスト用基板にあっては、テスト用基板本体に調整部材保持具を直接固定（例えば、螺着）することも可能であるが、テスト用基板本体の他方側に、補強板が固定され、調整部材保持具が、該補強板を介してテスト用基板本体に取り付けられていることが望ましく、このように補強板を設けることにより、補強板によりテスト用基板本体の変形を防止することができる。

【0012】

【発明の実施の形態】本発明に係るテスト用基板の実施の形態を図1及び図2を参照しつつ説明する。図1は本発明の実施の形態に係るテスト用基板の概略的断面図、図2は本発明の実施の形態に係るテスト用基板の要部拡大断面図である。

【0013】本発明の実施の形態に係るテスト用基板は、テスト用基板本体100と、下方側に設けられ被試験対象物に対して電気的接触を行うように設けられるとともに、このテスト用基板本体100にインターポーザ200を介して電気的接続がなされる接触子ユニット300と、テスト用基板本体100の上方に固定された補強板600と、この補強板600を介してテスト用基板本体100に取り付けられた調整部材保持具550と、この調整部材保持具550に螺着され接触子ユニット300の平行度を調整するための平行度調整部材500とを備えている。

【0014】前記接触子ユニット300は、被試験対象物に接触して電気的に接続するための複数の接触子からなる針ユニットと、この針ユニットを保持する針ユニットホルダとからなり、針ユニットは、前記インターポーザ200と電気的に接触するように設けられるとともに、上面において前記平行度調整部材500に当接する

ように設けられている。

【0015】また、前記針ユニットホルダは、後述する支持手段400によって支持されている。おな、インターポーザ200は、従来公知のものを採用することができ、例えば、独立して作動する板バネ部を有し、接触子ユニット300とテスト用基板本体100との間を電気的に接続するように設けられているものを採用することができる。

【0016】前記支持手段400は、従来公知の手段によることも可能であるが、本実施の形態においては、前記接触子ユニット300の縁部下方側において接触子ユニット300と対向するように設けられた鍔部411と、この鍔部411及び接触子ユニット300の間に介在されたスプリング等の弾性部材（図示省略）とから構成されている。この支持手段400としての鍔部411は、後述するように補強板600に固定手段440によって固定される支持部材410に設けられており、該鍔部411は、支持部材410の固定部位から内側に向けて突出して設けられている。前記支持部材410は、固定手段440としての固定ネジによって、前記補強板600に固定されており、具体的には、固定ネジ440が、上面側からテスト用基板本体100に設けられた穿孔を挿通して、支持部材410に螺着されている。

【0017】前記補強板600は、テスト用基板本体100の固定ネジ601により固定されており、該固定ネジ601は、例えばナベネジのように、ネジ頭部が水平に設けられたものを用いている。このため、テスト用基板本体100が熱の影響で水平方向に膨張するのを補強板600が拘束しないので、プローブカードの高さ方向の変位量が減少するというメリットがある。例えば、テスト用基板と補強板600とが完全に固定されている場合、バイメタルの状態になり上下方向に反ることになる。そこで、テスト用基板と補強板600とを固定する固定ネジ601のためのネジ孔に隙間を設けることでテスト用基板と補強板600とかがそれぞれ熱膨張するのを互いに規制しないようにする。その結果、上下方向に反る現象が低減される。ここで、固定ネジ601が皿ネジであると、皿ネジのネジ頭部にはテーパが形成されているため、ネジ孔の中心に強制的に拘束されるので、位置ずれが許容されない。しかし、ナベネジのように、ネジ頭部が水平に設けられたものを固定ネジ601として利用すると、テスト用基板と補強板とのネジ孔のずれを許容することができる。このため、固定ネジ601が皿ネジであれば、テスト用基板と補強板との間での位置ずれは許容されないため、テスト用基板と補強板600とのそれぞれの熱膨張は規制されるが、固定ネジ601がナベネジであれば、かかる熱膨張は規制されることがない。その結果、上下方向に反る現象が低減されるのである。

【0018】また、補強板600には、前記調整部材保

持具 550 が複数箇所（3 箇所）に螺着されており、該調整部材保持具 550 には、前記平行度調整部材 500 とのとしての平行度調整ネジ 500 が螺着されている。この平行度調整ネジ 500 は、回転により、上下方向に推移するように設けられている。より具体的には、該平行度調整ネジ 500 は、調整部材保持具 550 に螺着され、その下方がテスト用基板本体 100 に形成された穿孔 101 を挿通して、その先端が接触子ユニット 300 の上面に当接する設けられている（図 2 参照）。また、該補強板 600 は、支持部材 410 を固定する部位より

も内側に突出し、前記調整部材保持具 550 が螺着された突出部 603 を有している。
【0019】また、前記平行度調整ネジ 500 は、上部に回転を規制するための回り止めナット 510 が螺着されており、不用意に回転しないように設けられている。また、平行度調整ネジ 500 は、下方（先端部）において前記接触子ユニット 300 に当接するが、この平行度調整ネジ 500 の先端は、曲面状に形成されており、このため、従来のようにボールを不要としている。

【0020】また、前述のように平行度調整ネジ 500 を保持する調整部材保持具 550 は、補強板 600 に着脱可能に螺合されているとともに、回転させることにより上下方向の位置を変更可能に螺合されている。

【0021】また、この調整部材保持具 550 は、ウェハの試験時における高温下において、熱により変形（膨張）する材料から構成され、この調整部材保持具 550 の上部が、下部から離間する方向に変形するように設けられている。つまり、前記調整部材保持具 550 は、試験時における熱によって、テスト用基板本体 100 の変位に対応して、接触子ユニット 300 の接触子の変位量を調整するように設けられており、換言すれば、試験時の熱によりテスト用基板本体 100 が下方側（被試験対象物側）に変位しても、平行度調整ネジ 500 の螺着部分が原状付近に位置するように設けられている。

【0022】つまり、かかる調整部材保持具 550 は、補強板 600（又はテスト用基板本体 100）への固定部 571 と、平行度調整ネジ 500 が螺合される螺着部 561 とを備え、この固定部 571 及び螺着部 561 が高熱により相対的な距離が離間するように設けられている（図 2 参照）。

【0023】より詳述すると、調整部材保持具 550 は、保持具本体 560 と、この保持具本体 560 の下方から突設された突設部 570 とが一体的に設けられており、この保持具本体 560 の上部内面には、前記平行度調整ネジ 500 が螺合される螺着部 561 としての雌ネジ部が形成され、前記突設部 570 の外面には、補強板 600 に形成された雌ネジに螺合する前記固定部 571 としての雄ネジが形成されている。

【0024】また、調整部材保持具 550（の保持具本体 560 及び突設部 570）は、内部が空洞状に設けら

れており、前記平行度調整部材 500 が、螺着部 561 とのみ接触するように設けられている。なお、図示例においては、調整保持具 550（突設部 570）の下面がテスト用基板本体 100 に当接するように設けられているが、両者を罹患するように設けることも適宜設計変更可能な事項である。該調整部材保持具 550 は、例えばアルミニウムなどの線膨張係数の大きな材料などから構成することが可能である。

【0025】上記構成からなるテスト用基板にあっては、試験時に高温に至り、テスト用基板本体 100 が被試験対象物側（下方側）に変形しても、調整部材保持具 550 も変形し、平行度調整ネジ 500 の原状位置を維持することが可能となる。特に、平行度調整部材 500 は、調整部材保持具 550 のみに接するように設けられているので、かかる調整が的確かつ容易である。

【0026】また、調整部材保持具 550 は、テスト用基板本体 100 側に着脱可能に設けられているので、被試験対象物の変更等に従って、所望の調整部材保持具 550 に取り替えることが可能である。また、調整部材保持具 550 は、上下方向に移動可能に取り付けられるので、被試験対象物の変更等に従って、所望の位置に微調整して使用することも可能である。

【0027】なお、本発明は、上記各実施形態の構成に限定されるものではなく、本発明の意図する範囲内において、適宜設計変更が可能である。

【0028】例えば、調整部材保持具 550 を補強板 600 ではなく、テスト用基板本体 100 に直接取り付けように設けることも可能である。

【0029】また、上記実施の形態では、前記調整部材保持具 550 を補強板 600 に対して上下方向に移動及び着脱可能に設けているものについて説明したが、調整部材保持具 550 を固定して取り付けることも可能である。

【0030】

【発明の効果】以上説明したように、本発明に係るテスト用基板は、試験時における熱によっても、接触子ユニットの接触子の位置を原状付近とすることができ、導通良好な状態での試験を行うことができる。

【図面の簡単な説明】

【図 1】本発明の実施の形態に係るテスト用基板の概略的断面図である。

【図 2】本発明の実施の形態に係るテスト用基板の要部拡大断面図である。

【図 3】従来のこの種のテスト用基板の概略的断面図である。

【図 4】従来のこの種のテスト用基板の要部拡大図である。

【符号の説明】

100 テスト用基板本体
200 インターポーザ

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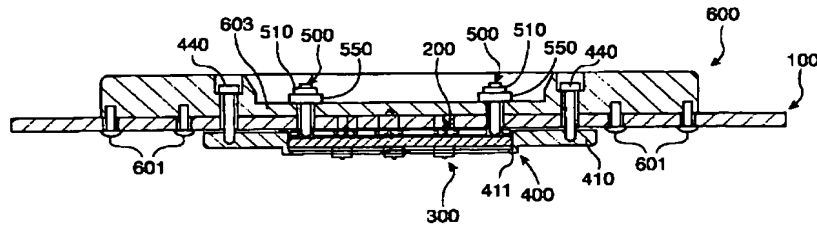
8

300 接触子ユニット
400 支持手段
410 支持部材
500 平行度調整部材
510 回り止めナット
550 調整部材保持具

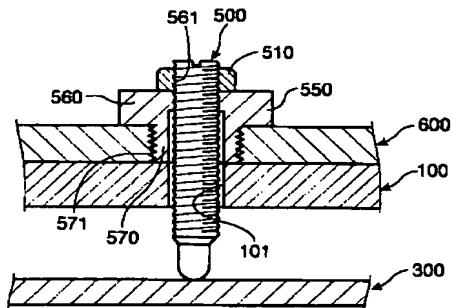
* 560 保持具本体
561 螺着部
570 突設部
571 固定部
600 補強板

*

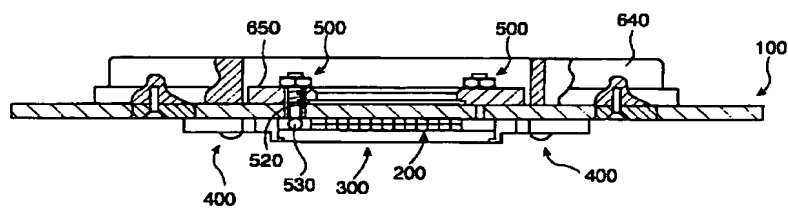
【図1】



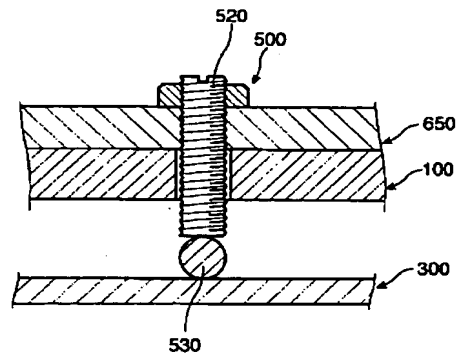
【図2】



【図3】



【図4】



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